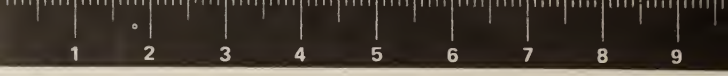
Agriculture Canada

PUBLICATION 1606 1976

METRIC AND GRAIN HANDLING



METRIC AND GRAIN HANDLING

The change to the metric system which began recently in the domestic operations of Canada's grain industry, will be phased in over several years to allow time to adjust. "Going metric" is necessary if Canada is to compete effectively in the competitive world of international grain trade.

Handling grain under the old system requires up to 13 conversions from pounds to bushels and vice versa depending on the final destination of the grain. This is inefficient and causes problems. Under the metric system, the 'metric ton' (tonne) is used for all grain handling operations.

Grain has long figured in measurements used by civilized man. For example, many years ago a 'foot' was defined as the length of 36 kernels of barley put end to end. However, with so much variation in size of grains, and in other measuring standards of the day, such units of measurement were hardly consistent. Consequently, the metric system — a set of dimensions based on an accurate, scientific measure — was designed during the nineteenth century. Metric's distinct advantage is that all its units — length, area, volume and weight (mass)[1] — are related in a way that simplifies calculation. Today, because of its simplicity, the metric system is replacing all other measurement systems in the world.

Let's look at the various aspects of metric conversion and consider what it means to you.

A QUICK LOOK AT METRIC

The metric system has a base of 10, like our dollars and cents. Just as a dollar is worth 100 cents, so a metre is composed of 100 centimetres. The metre is the basis of the whole metric system. A half metre is shown along the top of this publication, that is, 50 centimetres (50 cm). The 10 divisions between the centimetres are called millimetres.

The following table will help you understand the metric system. Note the prefixes which indicate size.

Area measurements are shown with a superscript^2 because two dimensions are required (length and width); and measures of volume are shown with a superscript^3 because three dimensions are required (length, width and height).

[1]To most people the difference between weight and mass is not important.

Prefix	Means Multiply by	Common Use	Example of symbols
Kilo	1000	A kilometre (1000 metres) A kilogram (1000 grams)	km kg
Hecto	100	Rarely used (hectometre)	hm
Deca	10	Rarely used (decametre)	dam
Unit	1	A metre, a gram, a litre	m,g,
Deci	1/10	Rarely used (decimetre)	dm
Centi	1/100	Mostly used for centimetres	cm
Milli	1/1000	Mostly used for millimetres and millilitres	mm ml

Measures of area are: square metre (m^2); square centimetre (cm^2); and square kilometre (km^2). For farmland measurements, the hectare (ha) is used — a square of 100 metres by 100 metres; in other words, an area of 10 000 m^2. All land area measurements will be expressed in hectares eventually. Rates of seeding etc., will be based on the hectare.

Measures of volume are cubic metre (m^3) and cubic centimetre (cm^3). The cubic kilometre is seldom used because it is too large.

The common unit for weight (or mass) is the kilogram which equals 1000 grams (see table). One thousand kilograms (1000 kg) equal 1 tonne (note the spelling). The metric tonne is heavier (by 205 lb) than the commonly used short ton (2000 lb). All weights in the grain industry are based on the tonne.

CHANGES

Let's assume we're looking at an elevator receipt under the new system. It shows 7.780 t — that's 7.780 tonnes delivered to the elevator.

Grain prices also are expressed differently. For example, wheat at $3.75 per bushel is $137.80 per tonne; barley at $2.24 per bushel becomes $102.90 per tonne; and at $1.10 per bushel oats are $71.35 per tonne.

Now, supposing our receipt shows 7.780 t of wheat delivered at $137.80 a tonne, we can expect to receive 7.780 × 137.80 = $1072.08 for the delivery. Grain elevator companies in Canada buy and sell grain by the tonne and most feed mills and feed retailers now sell their products in metric units.

Grain producers are **not** obliged to buy new seeders marked in metric. However, many farm machinery manufacturers will be selling seeder attachments with metric measurements. For the time being, a rule of thumb for seeding larger grains (wheat, barley, oats and corn) is that 1 lb/acre is about the same as 1.1 kg/ha. So for these crops there is no need to change existing equipment. However, growers who handle smaller seed sizes will need to follow instructions given on seed bags, or use conversion charts.

METRIC CONVERSION ON THE FARM

In getting used to the changeover, it's helpful to practice measuring in metric! Here are some examples:

1. How many tonnes of wheat, barley or oats does your truck hold?

Simple! Measure the width and length of your truck box. Metric tapes are available in many stores.

Suppose you find the truck box is 246 cm by 524 cm, or in metres that's 2.46 m by 5.24 m. Calculate the area of the box floor in square metres by multiplying 2.46 × 5.24 and you get 12.89 m^2.

Now, say you have a level load of wheat that is 1.20 m (120 cm) deep. How many tonnes are in the box? That depends on how much volume of grain will give 1 tonne. So you need to know the volume, which is easily found by multiplying the floor area (12.89 m^2) by the depth (1.20 m) and you get 15.47 m^3.

How many tonnes in 15.47 m^3 of wheat? This table will help:

	Average volume (m^3/t)
Wheat, soybeans	1.30
Flax	1.54
Corn	1.43
Rye	1.37
Rapeseed	1.56
Barley	1.61
Buckwheat	1.64
Oats (40 lb/bu)	2.13

So, in 15.47 m^3 of wheat there are:

$$\frac{15.47\ m^3}{1.30\ m^3/t} = 11.900 \text{ tonnes}$$

Using the same table, you can calculate how many tonnes of other grains the same volume in your truck box would contain, for example, flax 10.820 tonnes, barley 9.260 tonnes, or oats 7.730 tonnes.

The same procedure can be used to measure grain in a storage bin.

2. A simple measuring stick can show your load in tonnes at a glance.

Here is how it works: Calculate the depth of 1 tonne of grain in your truck box. Using the truck box in example 1, we have a floor area of 12.89 m^2 that will be loaded with wheat that has a volume of 1.30 m^3 per tonne.

To find the depth of 1 tonne of wheat, divide its volume by the area of the truck box floor, or in this case:

$$\frac{1.30\ m^3}{12.89\ m^2} = 0.10\ m\ (or\ 10\ cm)$$

For a truck box like the one in our illustration, a measuring stick marked at 10 cm intervals will indicate how many tonnes of wheat the truck holds.

You can use a broom handle or some other straight stick to make a measuring stick for each crop you handle. Remember, each stick is good only for the truck (or bin) for which it is made.

Instead of the measuring stick, you could mark the measurements on the truck box itself as they apply to the crops you will handle.

3. How to measure your land in metric.

An accurate knowledge of the exact size of your fields is important for efficient use of both land and machinery. Also, allowance must be made for unproductive areas such as drainage ditches and farm roads.

For measuring your land in metres, use the following simple formula:

$$\frac{width\ (m) \times length\ (m)}{10\ 000} = area\ in\ hectares.$$

If you don't have the measurements in metres, you can make a conversion using one yard equals 0.91 metre. If you have your land area in acres, multiply the acreage by 0.405 to get the area in hectares. As a rule of thumb, there are 2.5 acres in a hectare.

4. How to calculate weight from volume using metric.

A valuable feature of the metric system is that a cubic metre (m^3) contains 1000 litres (ℓ) and if this cube is filled with water it weighs 1000 kilograms (kg) or 1 tonne (t).

Density (weight per volume) is rarely used in the English system of measurement, but becomes quite handy with metric. The density of water is 1 tonne per cubic metre. If you know the density of a given material, by measuring its volume you can calculate its weight. The density of wheat is approximately 0.77

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t/m³. Therefore, a m³ of wheat weighs 1 m³ × 0.770 = 0.770 tonne or 770 kg.

HOW TO CONVERT POUNDS TO TONNES

lb	t	lb	t	lb	t
10	0.005	100	0.045	1000	0.454
20	0.009	200	0.091	2000	0.907
30	0.014	300	0.136	3000	1.361
40	0.018	400	0.181	4000	1.814
50	0.023	500	0.227	5000	2.268
60	0.027	600	0.272	6000	2.722
70	0.032	700	0.318	7000	3.175
80	0.036	800	0.363	8000	3.629
90	0.041	900	0.408	9000	4.082

Ex:

2000 lb	0.907 t
500 lb	0.227 t
70 lb	0.032 t
2570 lb	1.166 t

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The text for this pamphlet was adapted from Farm Letter #96 issued by Agriculture Canada

100M—38258—3:77
Cat. No.: A53—1606/1976
ISBN 0-662-00322-5

Runge Press
Contract No.: 01A08-5-38258

Français disponible sur demande